

Virginia Western Community College

ARC 221

Architectural CAD Applications Software I

Prerequisites

CAD 241

Course Description

Teaches the principles and techniques of architectural drawing practices through the use of architecture specific CAD software. Utilizes the commands and features of the software to generate drawings that emphasize architectural design and structural systems.

Semester Credits: 3 Lecture Hours: 2 Lab/Recitation Hours: 2

Required Materials

Textbook:

Revit Architecture 2015: A Hands-On Guide, 1st ed., author: Goldberg, Peach Pit Press, ISBN# 9780133144680

Other Required Materials:

USB Flash Drive



Course Outcomes

1. Understand the concepts of Revit Architecture.
2. Create building models.
2. Generate different analysis such as area, solar studies.
3. Create walkthroughs, detail views and schedules.

Instructor Objectives To teach students the basic building designing and modeling concepts using Revit Architecture software and use it in creating various real-world building designs. Instructor will emphasize self- learning and strongly encourage students to ask questions and participate in the class discussions.

Topical Description

Chapter 1: Introduction to Autodesk Revit Architecture 2008

Autodesk Revit Architecture 2008	1-2	
Autodesk Revit Architecture as a Building Information Modeler		1-2
Basic Concepts and Principles		1-2
Understanding the Parametric Building Modeling Technology	1-4	
Understanding Autodesk Revit Architecture Terms	1-4	
Creating a Building Model Using Parametric Building Elements		1-6
Visibility/Graphics Overrides, Scale, and Detail Level		1-8
Extracting Project Information		1-8
Creating an Architectural Drawing Set		1-8
Creating an Unusual Building Geometry		1-8
Flexibility of Creating Special Elements		1-9
Creating Structural Layouts		1-9
Working on Large Projects		1-9
Working in Large Teams and Coordinating with Consultants	1-9	
Starting Autodesk Revit Architecture 2008	1-10	
The User Interface		1-11
Invoking Tools		1-11
Title Bar	1-12	
Menu Bar		1-12
Toolbar		1-12
Standard Toolbar	1-13	
View Toolbar		1-13
Edit Toolbar		1-14



Tools Toolbar		1-14
Workset Toolbar	1-15	
Design Options Toolbar		1-15
Design Bar		1-15
Type Selector Bar		1-16
Element Properties Button	1-17	
Options Bar		1-17
Drawing window	1-18	
Project browser		1-18
Status Bar		1-18
View Control Bar	1-18	
Keyboard Accelerators		1-19
Dialog Boxes		1-19
Multiple Document Environment	1-20	
Interoperability of Revit Architecture		1-21
Building Information Modelling and Revit Architecture 2008	1-22	
Autodesk Revit Architecture Help	1-22	
Revit Architecture 2008 Help		1-23
Context Sensitive Help		1-25
Getting Started		
Tutorials		

Chapter 2: Getting Started with Revit Architecture

Starting a New Project		2-2
Setting Units		2-3
Length Unit Settings		2-3
Area Unit Settings		2-4
Volume and Angle Unit Settings		2-4
Snap Settings		2-5
Dimension Snaps	2-5	
Object Snaps		2-6
Temporary Overrides		2-7
Saving the Project		2-8
Using the Save As Tool		2-8
Using the Save Tool		2-10
Using the Save to Central Tool - Introduction to Worksets	2-10	
Modifying Other Settings	2-11	
General Tab		2-12
Graphics Tab		2-12
File Locations Tab		2-12
Spelling Tab		2-13
Rendering Tab		2-14
Closing a Project	2-15	
Exiting Revit Architecture		2-15
Opening an Existing Project		2-15
Opening an Existing Project Using the Open Tool	2-16	



Model Display Tools	2-19
Using the Zoom Tools	2-19
Dynamically Modifying the View	2-21
Using the Orient Tool	2-22
Other Display Options	2-23
Tutorial 1- Apartment 1	2-23
Tutorial 2- Club	2-27
Self-Evaluation Test	2-29
Review Questions	2-29
Exercise 1	2-31
Exercise 2	2-31

Chapter 3: Creating the First Project

Creating a Building Project	3-2
Sequence of Creating a Building Model	3-2
Understanding Wall Types	3-3
Creating Exterior Walls	3-4
Sketching Walls	3-11
Sketching Interior Walls	3-17
Tutorial 1- Apartment 1	3-20
Tutorial 2- Club	3-28
Tutorial 3- Apartment 1- Interior Walls	3-34
Tutorial 4- Club- Interior Walls	3-41
Self-Evaluation Test	3-46
Review Questions	3-47
Exercise 1	3-48
Exercise 2	3-49
Exercise 3	3-50

Chapter 4: Using Basic Building Components-I

Using Doors in a Building Model	4-2
Adding Doors	4-2
Understanding Door Properties	4-4
Adding a Door to a Wall	4-7
Using Windows in a Building Model	4-8
Adding Windows	4-9
Understanding Window Properties	4-11
Adding a Window to a Wall	4-13
Creating Openings in Walls	4-15
Tutorial 1- Apartment 1	4-15
Tutorial 2- Club	4-26
Self-Evaluation Test	4-31
Review Questions	4-32
Exercise 1	4-33
Exercise 2	4-34
Exercise 3	4-35



Chapter 5: Using the Editing Tools

Creating a Selection		5-2
Selecting Multiple Elements		5-2
Restoring the Selection		5-3
Removing Elements from a Selection		5-3
Moving and Copying Elements		5-4
Changing the Temporary Dimensions		5-4
Using the Drag Option		5-4
Dragging End-joined Components	5-5	
Using the Move Tool		5-5
Using the Copy Tool		5-6
Trimming and Extending Elements	5-7	
Using the Trim/Extend to Corner Option	5-7	
Using the Trim/Extend Single Element Option		5-9
Using the Trim/Extend Multiple Elements Option	5-9	
Cutting and Pasting Elements		5-11
Cutting Elements	5-11	
Copying Elements to the Clipboard	5-11	
Pasting Elements from the Clipboard		5-11
Rotating Elements		5-12
Mirroring Elements		5-14
Using the Pick Option		5-14
Using the Draw Option		5-15
Creating an Offset		5-16
Creating an Array of Elements		5-18
Linear Array		5-18
Radial Array		5-20
Matching Elements		5-22
Aligning Elements and Working with Constraints	5-22	
Deleting Elements		5-23
Splitting Walls		5-24
Grouping Elements		5-25
Creating Groups by Selecting Elements in the Project Views	5-26	
Creating Groups Using the Group Editor	5-26	
Creating a Detail Group		5-27
Placing Groups		5-28
Swapping Groups	5-29	
Modifying Groups		5-29
Excluding Elements from the Group		5-29
Saving and Loading Groups		5-30
Converting Groups to Linked Revit Model	5-31	
Deleting Groups	5-32	
Creating Similar Elements	5-32	
Pinning Elements	5-32	
Resizing Elements		5-33
Using Diagnostic Tools	5-34	
Measuring Distance Between Elements		5-34



Selecting Elements Using the Element ID	5-35	
Tutorial 1- Apartment 1		5-36
Tutorial 2- Club		5-41
Self-Evaluation Test		5-47
Review Questions		5-48
Exercise 1		5-48
Exercise 2		5-49
Exercise 3		5-50
Exercise 4		

Chapter 6: Working with Datum and Creating Standard Views

Working with Levels		6-2
Understanding Level Properties		6-3
Adding Levels		6-5
Modifying Level Parameters		6-7
Hiding Elements in a View		6-9
Controlling the Visibility of Levels	6-10	
Working with Grids		6-11
Creating Grids		6-11
Modifying Grids	6-16	
Grid Properties		6-17
Controlling the Visibility of Grids	6-19	
Reference Planes	6-19	
Work Planes		6-20
Setting the Work Plane		6-20
Controlling the Visibility of Work Planes		6-21
Working with Project Views		6-22
Viewing the Building Model		6-22
Visibility/Graphics Overrides of an Element	6-23	
Visibility/Graphics Overrides of an Element Category		6-24
Making Elements Transparent		6-25
Using the Temporary Hide/Isolate Tool		6-26
Plan Views		6-27
Elevation Views		6-28
Section Views		6-31
Using the Scope Box Tool	6-36	
Tutorial 1- Apartment 1		6-38
Tutorial 2- Club		6-46
Self-Evaluation Test		6-52
Review Questions		6-53
Exercise 1		6-54
Exercise 2		6-55

Chapter 7: Using Basic Building Components-II

Creating Floors		7-2
Sketching the Floor Boundary		7-4
Creating Roofs		7-6



Creating the Roof by Footprint	7-6
Creating the Roofs by Extrusion	7-9
Modifying the Roof Shape and Properties	7-12
Shape Editing Tools for Slopes, Floors, and Roofs	7-15
Modify Sub-Elements	7-15
Draw Points	7-16
Draw Split Lines	7-17
Pick Supports	7-17
Reset Shape	7-17
Creating Ceilings	7-17
Creating an Automatic Ceiling	7-18
Sketching the Ceiling	7-18
Using the Pick Walls Method	7-19
Modifying the Ceiling	7-20
Rooms	7-22
Adding Rooms	7-22
Calculating Room Volumes	7-26
Cutting Openings in the Wall, Floor, Roof, and Ceiling	7-26
Joining the Walls with the Other Elements	7-28
Using the Attach/Detach Tool	7-28
Tutorial 1- Apartment 1	7-29
Tutorial 2- Club	7-34
Self-Evaluation Test	7-42
Review Questions	7-43
Exercise 1	7-44
Exercise 2	7-44

Chapter 8: Using Basic Building Components-III

Using Components in a Project	8-2
Adding Components	8-2
Using Stairs in a Project	8-5
Adding Stairs	8-5
Modifying Stairs Properties	8-6
Creating Stairs by Sketching Runs	8-8
Creating Stairs by Sketching the Boundary and Riser Lines	8-12
Using Railings in a Building Model	8-14
Creating Railings	8-14
Modifying Railing Properties	8-16
Creating Ramps	8-16
Using Curtain Systems in a Project	8-18
Creating a Curtain Wall Using the Wall Tool	8-19
Creating a Curtain System by Lines	8-19
Creating a Curtain System by Face	8-20
Adding Curtain Grids	8-20
Modifying Curtain System Panels	8-21
Adding Doors and Awnings to a Curtain System	8-22
Adding Mullions	8-22



Copying Elements from One Level to Another	8-23
Using the Paste Aligned Tool	8-23
Tutorial 1- Apartment 1	8-24
Tutorial 2- Club	8-31
Tutorial 3- Elevator and Stair Lobby	8-34
Self-Evaluation Test	8-42
Review Questions	8-42
Exercise 1	8-43

Chapter 9: Adding Site Features

Creating a Toposurface	9-2
Creating Toposurface Subregions	9-4
Splitting a Toposurface	9-5
Merging Toposurfaces	9-6
Creating Toposurface Using the Imported Data	9-7
Setting the Site Properties	9-7
Adding Property Lines	9-9
Sketching Property Lines	9-9
Creating Property Lines Using Distances and Bearings	9-10
Creating Building Pads	9-11
Adding Site Components	9-13
Adding Parking Components	9-14
Adding Labels to Contours	9-14
Tutorial 1- Site Plan	9-15
Self-Evaluation Test	9-31
Review Questions	9-31
Exercise 1	9-32
Exercise 2	9-33

Chapter 10: Using Massing Tools

Understanding the Massing Concepts	10-2
Creating the Massing Geometry	10-3
Using the Create Mass Tool	10-4
Editing the Massing Geometry	10-10
Creating Cuts in the Massing Geometry	10-11
Placing the Massing Geometry	10-13
Creating Building Elements from the Massing Geometry	10-13
Creating Walls by Selecting Faces	10-13
Creating Floors by Selecting Faces	10-14
Roofs by Selecting Faces	10-15
Creating Curtain Systems by Selecting Faces	10-16
Controlling Visibility of the Massing Geometry	10-17
Adding Other Building Elements	10-17
Creating Families	10-19
Creating In-Place Families	10-19
Creating Families Using the Standard Family Templates	10-19



Tutorial 1- Office Building 2	10-28
Self-Evaluation Test	10-43
Review Questions	10-43
Exercise 1	10-44
Exercise 2	10-46

Chapter 11: Adding Annotations and Dimensions

Adding Tags	11-2
Tagging Elements	11-3
Tagging All Elements in a View	11-6
Adding Room Tags	11-8
Room Separation	11-8
Adding Room Tags	11-10
Adding Keynotes	11-11
Adding Symbols	11-12
Adding Dimensions	11-13
Dimensioning Terminology	11-14
Converting Temporary Dimensions to Permanent Dimensions	11-15
Adding Permanent Dimensions	11-16
Editing Dimensions	11-18
Controlling the Tick Mark and Dimension Arrow Display	11-20
Creating Automatic Linear Wall Dimensions	11-21
Adding Spot Dimensions	11-21
Placing a Spot Dimension	11-21
Modifying Spot Dimension Properties	11-22
Tutorial 1- Apartment 1	11-23
Self-Evaluation Test	11-32
Review Questions	11-33
Exercise 1	11-34
Exercise 2	11-35
Exercise 3	11-36

Chapter 12: Creating Project Details and Schedules

Project Detailing in Autodesk Revit Architecture	12-2
Creating Details Using the Building Model	12-2
Creating a Callout View	12-3
Displaying the Callout View	12-3
Modifying Callout View Properties	12-4
Creating Details in the Callout View	12-6
Crop Regions	12-7
Model Crop Region	12-7
Annotation Crop Region	12-7
Creating Drafted Details	12-12
Creating a Drafting View	12-12
Drafting a Detail	12-13
Line Styles Settings	12-13
Using Line Weights	12-15



Using Line Patterns		12-16
Adding Text Notes		12-17
Creating Text Notes		12-17
Editing Text Notes		12-18
Creating a Model Text		12-20
Revision Clouds		12-22
Creating a Revision Cloud	12-23	
Adding a Revision Tag		12-24
Using Schedules in a Project		12-25
Generating a Schedule		12-26
Creating a Legend View		12-29
Tutorial 1- Apartment 1- Callout View		12-30
Tutorial 2- Apartment 1- Schedules	12-40	
Tutorial 3- Road Section Detail		12-44
Self-Evaluation Test		12-50
Review Questions		12-50
Exercise 1		12-51
Exercise 2		12-52
Exercise 3		12-53

Chapter 13: Creating Drawing Sheets and Plotting

Creating Drawing Sheets	13-2	
Adding Drawing Sheet to a Project	13-2	
Adding Views to the Drawing Sheet		13-5
Modifying the View Properties		13-7
Adding Schedules to the Drawing Sheet		13-9
Modifying the Building Model from the Drawing Sheet		13-11
Duplicate Dependent Views		13-11
Creating Dependent Views		13-12
Adding Matchline to the Dependent Views	13-13	
Printing in Autodesk Revit Architecture		13-14
Printing Drawing Sheets and Project Views	13-15	
Selecting and Modifying the Printer Settings	13-15	
Using the Print Setup Dialog Box	13-18	
Previewing the Print Setup	13-19	
Tutorial 1- Apartment 1		13-20
Self-Evaluation Test		13-25
Review Questions		13-26
Exercise 1		13-27
Exercise 2		13-29

Chapter 14: Creating 3D Views

Three-Dimensional (3D) Views		14-2
Creating Orthographic Views		14-3
Dynamically Viewing the Building Model	14-4	
Using the Orient Tool		14-6
Generating the Perspective Views	14-8	



Using the Section Box	14-15
Tutorial 1- Apartment 1	14-16
Tutorial 2- Club	14-21
Self-Evaluation Test	14-25
Review Questions	14-26
Exercise 1	14-27
Exercise 2	14-28
Exercise 3	14-29

Chapter 15: Rendering Views and Creating Walkthroughs

Rendering Views	15-2
Rendering Scene Settings	15-3
Lighting Settings	15-12
Modifying Sun and Sky Settings	15-13
Using Radiosity	15-16
Using Materials and Textures	15-17
Using the Paint Tool	15-22
Rendering Views Using the Raytrace Tool	15-22
Using the Display Model Tool	15-24
Selecting the Plant Season	15-24
Adding Archvision, Real People, and Vehicles	15-27
Using the Decal Tool	15-27
Placing a Decal	15-27
Editing a Decal	15-29
Creating a Walkthrough	15-29
Creating the Walkthrough Path	15-29
Editing and Playing the Walkthrough	15-30
Recording a Walkthrough	15-33
Tutorial 1- Apartment 1	15-35
Tutorial 2- Office Building	15-48
Self-Evaluation Test	15-53
Review Questions	15-54
Exercise 1	15-55
Exercise 2	15-56

Chapter 16: Using Advanced Features

Creating Structural Components	16-2
Creating Structural Walls	16-4
Creating Structural Columns	16-5
Adding Structural Beams and Braces	16-8
Cutting Openings in Beams, Braces, and Columns	16-9
Creating Multiple Design Options	16-10
Generating Design Options for a Project	16-10
Presenting Design Options	16-11
Using Area Analysis Tools	16-12
Area Schemes	16-13



Area Plans	16-14
Area Schedules	16-16
Color Schemes	16-17
Creating Color Schemes	16-17
Masking Regions	16-22
Adding Masking Regions to a Project	16-22
Using Project Phasing Tools	16-23
Understanding Phasing Concepts	16-23
Linking Building Models and Sharing Coordinates	16-25
Linking and Importing Models	16-26
Linking Revit Models	16-28
Nested Linked Models	16-29
Converting Linked Models to Groups - Binding Links	16-31
Managing Links	16-33
Including Elements of Linked Models in Schedules	16-33
Applying the Color Schemes of Host Model to Rooms and Areas of the Linked Models	16-34
Copying Linked Model Elements	16-35
Sharing Projects by Using the Worksets	16-35
Creating Worksets	16-36
Subdividing the Building Model into Worksets	16-36
Creating a Central File	16-37
Creating Local Files	16-38
Purging Unused Element Families	16-39
Transferring Project Standards	16-39
Organizing the Project Browser	16-40
Generating Shadows	16-40
Revit Architecture Solar Studies	16-40
Generating Still Solar Study	16-41
Creating an Animated Solar Study	16-42
Revit Architecture Interoperability	16-45
Publishing Tips in Revit Architecture 2008	16-47
Tutorial 1- Apartment 1	16-49
Tutorial 2- Apartment Complex	16-60
Self-Evaluation Test	16-68
Review Questions	16-68
Exercise 1	16-69
Exercise	
2	



Notes to Instructors
(List information about optional topics, departmental exams, etc)

1. The final project/exam is worth 15-20% of the final grade.

